

**FACING BIRD CONSERVATION IN CONFLICTED
COMMUNAL LANDS:
A PARTICIPATORY EXPERIENCE TOWARDS THE
SIERRA MADRE SPARROW HABITAT
CONSERVATION¹.**

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I. Introduction

Recognition of the importance of biological diversity and its conservation has been met with increasing efforts towards its protection. A widely adopted response to biodiversity conservation has been nature protection through exclusionary means. An extensive network of protected areas has been established with the objective of protecting biodiversity from communities (McNeely and Pitt 1985; Gómez-Pompa and Kaus 1992; Pimbert and Pretty 1995). This approach assumes that there is an inverse relationship between communities, their needs and actions, and the protection of biodiversity (Pimbert and Pretty 1995). Local communities living in proximity to the species to be protected are seen as a threat or at least as impediments to biodiversity conservation. Accordingly conventional approaches to biodiversity conservation have aimed to protect nature from human action by creating a fortress around species and ecosystems and keeping people out (Pimbert and Pretty 1995; Smith 1995; Alvard 1998).

In the last two decades this conventional approach to biodiversity conservation has come under wide criticism. Its critics highlight both the technical and ethical issues it raises. They stress how exclusionary approaches to biodiversity conservation pose a threat to the food security and livelihoods need of people living in and around protected areas as well as the lack of success this approach has had in actually achieving species conservation (Ghimire 1992; Kothari *et al* 1989; Wells and Brandon 1992; West and Brechin 1992). Growing dissatisfaction with conventional approaches to biodiversity conservation has opened the way for a new perspective, seeking to incorporate the participation of local people in biodiversity conservation. Over the last two decades, a tradition of theory and research examining participatory deliberation as a potential and partial solution to the problems faced by conventional approaches to biodiversity conservation has emerged. Participation has become a field in itself, addressing the many meanings of the term, how it can be implemented, its benefits, challenges and drawbacks.

Participation has not only challenged the way conservation is implemented but has also challenged conservation science. While the conventional approach to conservation biology is based on a scientific, reductionist understanding of biodiversity, conservation biology scientists are now being asked to adopt a multidisciplinary, interactive and reality-based approach to conservation biology (Latta 2000:133;

Ehrenfeld 2000:111). As Ehrenfeld insightfully concludes, for conservation biology to be successful there is a need for practitioners to “knock down the walls around their expertise, share their knowledge with the community, and learn from it in turn” (Ehrenfeld 2000:111). A call for a creative and respectful integration of “science” into community life is being advocated as a way to achieve effective conservation, an endeavor that is currently absent in the practice of tropical bird conservation (Western and Wright 1994; Ehrenfeld 2000; Potvin *et al.* 2000).

Bird Conservation in Mexico

In Mexico and North America, recent bird conservation actions have centered on carrying out research oriented to fill the gaps on species information (e.g., species lists and habitat relationships), legislation (e.g., endangered species lists) and policy (e.g., North American Bird Conservation Initiative) (Collar *et al.* 1992; CCA 1999; Birdlife International 2000; Ceballos and Marquez-Valdelamar 2000; NABCI 2002; Hoth 2002). Studies on Mexican bird conservation initiatives have identified a total of 192 species under an endangered risk status, from which 45 species are considered threatened with extinction and 11 have gone extinct during the last century (Ceballos and Marquez-Valdelamar 2000). Unfortunately, bird conservation efforts around the world seem to offer few successful examples as well (Marzluff and Sallabanks 1998; Birdlife International 2000). The absence of information on basic species data, and the fact that most of the ornithological research has been biologically oriented, represents important barriers for progress in bird conservation. Literature on bird conservation shows plenty of information on bird taxonomy, bird ecology and even on “bird conservation” (e.g., Marzluff and Sallabanks 1998), but an effective methodology for bird conservation projects have not yet been established.

Despite bird conservation efforts in Mexico, local communities living around or in these important bird areas are generally not aware of the existence of threatened species and the vulnerability of supporting habitat. Although there is recognition of the socioeconomic needs of communities living around or in these important bird areas, to date, only education and outreach activities have been considered in the framework of bird conservation (NABCI, 2002). Bird conservation involving analysis of local realities,

with specific cultural contexts, economic needs and even particular political frameworks, are at best, in the experimental stage (see Escalante *et al.* 1998 and Herkenrath, 2002).

This research confronts this reality by addressing concerns over a bird species threatened with extinction, the Sierra Madre Sparrow (SMS) (*Xenospiza baileyi*), a species endemic to Mexico (Picture 1). This species has suffered a regional extinction in its northern populations because of habitat destruction (Collar, *et al.* 1992; Birdlife International and Capper 2000) and its only remnant population is located in a reduced and fragmented grassland area south of Mexico City, one of the most overpopulated cities in the world. The SMS has been ranked as critically endangered and as a high priority species for conservation and research (Stotz, *et al.* 1996; Ceballos and Marquez-Valdelamar 2000).

An integrative and participatory research approach for SMS conservation

With the conviction that bird species conservation requires a new perspective that attempts to integrate an understanding of local communities and local knowledge into a comprehensive framework, this research adopts an integrative approach to describe, analyze and synthesize biological, ecological and social information required to develop effective strategies for SMS conservation based on local ecological and social situations. This task has required a combination of methods and approaches that allow for the understanding of species biology, habitat relationships and driving forces that are shaping the land.

Data and results presented in this paper are part of a larger research project made up of four inter-related studies: (1) nesting site selection, (2) species dispersal ability, (3) habitat post-fire assessment and (4) local participation and traditional grassland management practices. The integration of these inter-related data sets with the experience of community members, through their participation in the research, offers an innovative procedure for linking bird conservation research with and understanding of local land use practices which may contribute to developing a model of research and reasoning to achieve effective bird conservation goals.

In order to build collaborative relationships and trust between scientists and community members and between members of the same communities (Meredith 1998; 2000; Velázquez et al. 2000) this research has been structured following conceptual frameworks, methods, and experiences from participatory and community-based research approaches (Chambers 1993; 1994; Meredith 1998; 2000) It establishes a participatory process whereby communities participate in different stages of research design, data collection and interpretation of results (Ticktin 2000). In this way, “local peoples may come to adopt and assume [future] conservation plans” (Ticktin 2000:227) that respond more effectively to their concerns and local situations (Ehrenfeld 2000; Meredith 2000; Frias 2004 unpublished).

In this paper we describe the process of people participation oriented to the local grasslands conservation (the SMS's habitat), addressing main successes and barriers influencing the process and conciliating scientific and local concerns. We also present the resultant information derived from this process to document particularly the traditional knowledge in grasses, grassland management practices, with emphasis on historical and recent practices (e.g., use of fire, grazing areas) and main problems occurring in the grasslands related to land tenure, land use and land change.

II. The study area and the social setting

This research took place at Milpa Alta (19° 13' N, 98° 57' W) and San Juan Tlacotenco towns (19° 02' N, 90° 00' W) located in the south-east of Distrito Federal and north-east of Morelos (México). This region corresponds to the denominated south of the Mexican Valley (Velázquez 1993; Velázquez and Romero 1999), which is embedded in the Transversal Mexican Belt, a system of mountains characterized by its recent volcanism, high biological richness and an important number of endemic species (Moore 1945; Goldman and Moore 1946; Fa and Morales 1996; ICBP 1992; Velázquez and Romero 1999). The climate is temperate, sub-humid, mild to cool, with a mean annual temperature of ca. 16 °C. February is the coldest month and June is the warmest. The mean annual rainfall is ca. 800 mm. (Velázquez 1994; INEGI 2000).

Milpa Alta is one of the largest regions in the Distrito Federal, covering 19.2% of the total area, with a population of 96 744 persons and an average annual population growth

rate of 4.2 % (INEGI, 2000). The name Milpa Alta refers at the same to the indigenous community made up of nine towns of Nahuatl origin. The nine towns have 27,000 hectares under communal system (Flores 1992). The Milpa Alta community is represented by “*La Representación de Bienes Comunes de Milpa Alta*”², which was formed in 1980 (Flores 1992) after intense social movements (Del Conde 1982). The objectives of this social organization are fundamentally to find a resolution concerning persistent agrarian problems, the recovery of the ecological and productive vocation of communal lands, and fortification of the native language and cultural patrimony (DCI 1998; Flores, J., pers. comm.). The general assembly is the main decision-making organ in the community.

The community of San Juan Tlacotenco is located in the north of the Tepoztlan Municipality (Estado de Morelos) and find its northern limits with the south of Milpa Alta. San Juan Tlacotenco is recognized as a very traditional indigenous community of 2000 habitants and it was founded in the year 1470 a.c (Romero 2002). Its resident's interests are coordinated through the Communal Representation elected by a local assembly and formally constituted in 1976.

III. Methods

The methods used for data collection for this paper included participatory and conventional methods. In this section we describe the steps followed to establish academic-community collaboration and the methods used. The first step taken was to establish initial contact and communication with the communal authorities of Milpa Alta and San Juan Tlacotenco, the Natural Resources Commission (CORENA³) and a regional grassroot organization involved in popular environmental education, GEMA (Grupo de Educación para el Medio Ambiente). Several meetings were established to present the research project to the Communal Assemblies and community members in general. These were followed by meetings and coordination work with the community representatives to

² In this study we use indistinctly Representación de Bienes Comunes or Communal Representation to make reference to same social institution.

³ CORENA is the *Comision de Recursos Naturales*, a governmental agency responsible of environmental planning and management in natural areas at south of Mexico City.

establish a common agenda, merging initial research proposed and local interests, based on the establishment of common interests.

Topical semi-structured interviews (n=30) were carried out with local herders, communal authorities and community members in general. The interviews were based on pre-designed questions, but they were presented in an informal, discursive way to establish greater trust, dialogue and increase opportunities for locally relevant information to emerge. The questions were focused on the issues of grassland management; land tenure, land uses and land change, environmental problems, environmental-social history and people organization-participation.

Workshops (6 in Milpa Alta and 3 in San Juan Tlacotenco) were pre-designed and nurtured by collaboration with some community members and GEMA. The workshops helped in sharing information on environmental local concerns and to meet and involve local people. The workshops represented a space to start process of information exchange between local people and the academic researchers involved in the project and to have final discussion in search for solutions. They also provided a means to get together, have fun and to get to know each other.

The main activities implemented within the workshops were a participatory diagnosis, participatory mapping, bird watching, oral histories and talks and educative activities. The participatory diagnosis is a popular education tool used for identifying local problems and needs as they are understood by local people (ACCES 2000). It involved community members in identifying problems in the *monte*⁴ and in the community in general. It was also procured to search for possible solutions from a local perspective (Mukherjee 1993; Chambers 1994; Frias and Hurtado 1998). The participatory diagnosis involved as many community organizations and individuals as possible. It included men, women, elderly people, youth and children.

Participatory mapping (transect walk, local landscape diagramming) and oral histories allowed us to involve people in a direct way with the SMS and grassland situation and assisted local people to represent resources and features graphically, manifesting the significance they attach to them (IAPAD 2000). This technique was used

⁴ *Monte* is the common name of the local ecosystems within the communal territory. The term makes reference to the different type of forests and grasslands.

for sample site selections and helped to generate reflection and discussion over the situation of local natural resources (focused on grassland), their problematic, history and possible solutions.

Bird watching allowed us to involve people in the identification (both visual and through sounds) of the SMS directly in its habitat. Knowledge on bird grassland diversity and ecological relationships was share between assistants.

Talks and educative activities focused on biodiversity in general and SMS in particular. Round table discussion sessions took place in the Communal House of Milpa Alta and San Juan Tlacotenco. Different researchers participated, offering talks focused on biodiversity, natural resources conservation and community-based conservation in Mexico. The 15 minutes video film (VHS) titled “Towards the SMS conservation, a participatory experience in Milpa Alta”⁵ was produced and used to extend the information concerning the project and it was exhibited in all the schools of Milpa Alta and San Juan Tlacotenco. Discussion sessions and educative activities were implemented in this “video-sessions”.

Activities proposed by participants were included. These talks occurred both in the grasslands and in the Communal House.

Assuming that the information is empowering as it supports community initiatives and informs the community with knowledge not accessible to them before (Frias and Hurtado, 1998), the experience and the information gathered has been analyzed, integrated and disseminated through different techniques and media (informational workshops, written and audiovisual materials).

IV. Results

The participatory experience

The engagement

One of the objectives of this study was to engage people from Milpa Alta and San Juan Tlacotenco in a participatory process for the conservation of the SMS. Starting a process

⁵ This video was produced through the collaboration of the IFE (Instituto Federal Electoral, Mexican Government). Copies are for consultation in the Representación de Bienes Comunes de Milpa Alta and local library).

of participation in these communities presented several challenges. From the beginning it was difficult to stir people's interest in the SMS and its endangered status. The fact that the predicament of the SMS was an unknown issue at the local level presented an initial challenge. A second challenge to stirring local interest in the conservation of the SMS was the fact that it is a non-charismatic, non-utilitarian species, and thus its endangered status is not immediately perceived as important by local people. Initially, people did not show interest in "saving" a small and brown bird. People openly questioned the reasoning behind attempts to protect the SMS. "Why protect a sparrow? If there are a lot of them!" was a typical local reaction. People usually refer to sparrows as inconspicuous and boring birds (Rising 1996) and in this case most people would not recognize the name of the SMS at the outset and confused it with the House Sparrow (*Passer domesticus*, known popularly as *gorrión*⁶) or House Finch (*Carpodacus mexicanus*, known as *Gorrión Mexicano*) sparrows, which are quite common and easy to find in urban landscapes.

Our initial failure at raising interest in the SMS led us to notice that while people did not demonstrate much interest on the SMS, they were quite interested in engaging in dialogue about the grasslands, the land uses and the conservation of the *monte*, all of these directly linked to the SMS's habitat. This illustrates how when conservation issues are seen and understood through the eyes of conservation scientists it can fail to portray its local reality, thus leading to locally unworkable solutions. Pimbert and Pretty (1995) argue that conservation scientists tend to perceive conservation through the narrow windows of their discipline, as their training has them look at just one aspect of the ecosystem (Pimbert and Pretty 1995:13), in this case we, the researchers, initially concentrated on the SMS. Accordingly, in our first attempt to engage people in what was of primordial interest to us failed. We quickly understood however, that our interest on bird conservation was highly compatible with the interest of local people, the grasslands and habitat of the SMS. Recognition of common interests between researchers and local people, and maintaining a flexible research agenda led to a problem redefinition and thus facilitated local interest and engagement in this research. As Little (1994) contends, the extent to which local people participate in problem definition is an important factor affecting program success. Pyhala (2002) argues that this is particularly true in

⁶ *Gorrión* is the popular denomination of sparrows and species alike.

biodiversity conservation where most debate around the subject takes place in the North. Accordingly, conventionally, biodiversity conservation decisions regarding “what, where and how to conserve” are made by scientists (Uphoff 1992) ignoring the local understanding of the issues.

A fundamental catalyzer element of this initial phase of the process was adhering to the philosophy of establishing true collaboration between academic researchers and local people, “sharing knowledge and working together” (Allen 1995; 1998). It was the objective of this research to go beyond basic research requirement of obtaining local authorization to carry out research or carrying out an “educational campaign” about the SMS. This would have perpetuated the notion that scientific knowledge is more valuable than the knowledge and experience of local people reaffirming a power imbalance between academics and local community members (Chambers 1997; Edwards 1989). Through this study, local people manifested to be frequently ignored by academics, as researchers enter their communities to do research without even asking for authorization. In addition, they reported that research results from these studies are never communicated back to the community. Throughout this study people expressed to feel respected, valued and taken into account when they were considered as owners of relevant knowledge and their opinions were heard and shared horizontally with those of academics.

Lessons from this study suggest that local engagement is more successful when it responds to issues that are of local interest or respond to a local understanding of conservation. Following academic pre-established agendas runs the risk of failing to elicit local interests, resulting in the perpetuation of a power relationship between academics and community members. Pimbert and Pretty (1995) argue that the central issue for a new conservation science is to find ways of putting people back into conservation. This study shows that the establishment of horizontal relationships between conservation scientists and communities can provide a forum for integrating scientific and local knowledge thus moving us a step closer in the understanding of conservation issues and solutions.

Having access to the monte

Establishing collaboration between researchers and community members permitted access to communal lands normally out of bounds to researchers. Multiple meetings, conversations and project presentations led to the granting of authorization for field work⁷ in the *monte* by communal authorities. Official letters from the Communal Representation of Milpa Alta and San Juan Tlacotenco were extended under unanimous approval by community members, provided that wildlife species of the *monte* were respected, no collecting individuals, and avoiding altering vegetation. The deliberation of results from field work to the Communal Representation was also requested. Establishing collaboration does not restrict the use of conventional scientific research methods. In this case there were research objectives, such as the species' study that were carried out mainly by scientific researchers. However, collaboration entails an attitude of reciprocity. Accordingly, research results were provided back to community members further enriching the academic-community knowledge exchange. Local engagement in the project also increased local interest in scientific research findings, supporting Sclove *et al.*'s (1998) assertion that academic-community collaboration has the potential of increasing the relevance of academic research.

The workshops

The initial workshops carried out through this study had a difficult start. People's daily activities made difficult the establishing of a convenient time for doing the workshops. People from both towns expressed that while interested in participating they did not have the time to attend the workshops. This was particularly true for herders and farmers, who spend most of their time in the *monte*. The first workshop programmed was cancelled because people got confused about where it would take place and the time. Ramiro Taboada†, an official communal authority of Milpa Alta provided an insight as to the difficulty experienced by community members in participating in events. He said: "...it is difficult to organize things on Saturday morning, most of the people are working during the morning....you should organize it at nights". After different failed attempts, the first workshop got organized through a grassroots environmental organization, the Group

⁷ The field work in the *monte* is linked to the biological and ecological parts of this study (1, 2 and 3) interconnected with this social phase.

Yolnemilizotl, coordinated by Victor Chavira, *comunero*⁸ from Milpa Alta. In collaboration with a recognized popular education group (GEMA), the first workshop resulted in a success. Through informative talks about local environmental issues, educational games and focus groups sessions, local people let their voice be heard. Under a relaxed atmosphere, we danced and had traditional food while we got to know each other as people and not as academics and community members. The workshops provided relevant local information: a distributional map of important species of flora and fauna was produced, a 3D model of their *monte* and “data bases” containing species names, local use and abundance were created. However, the most important result from the workshop was not the provision of information. The workshops provided a space to establish [even initially] more open and horizontal relationships, trust and friendship among local residents and academics (outsiders). Frias (2004 unpublished) argues that conventional power relations between academics and communities act as a barrier to establishing collaboration. Workshops where the knowledge of academics and community members are both valued in an atmosphere that is relaxed and promotes trust, provide favourable conditions for braking down these power relations.

Workshops were designed to build-up on previous experience. Of relevance to be mentioned is the workshop held in the *monte* with the participation of more than 50 people of all ages, men and women and communal authorities. PRA mapping and oral histories were used to identify land tenure boundaries and disputed areas as well as assisted in documenting the local history of struggles for the defense of the communal *monte*. Through collective analysis we academics and community members involved, reflected on the importance of the *monte* as a reservoir of natural resources and its important role for Mexico City’ population and regional ecology. The interactive dialogues revealed, to all participants, the connections between community members’ livelihoods and the *monte* and the necessity for organized collective action for its conservation. Grasslands were recognized as a main source of pasture, raw materials, mushrooms and medicinal plants. The local name of grasses, their use and management

⁸ The Mexican Constitution of 1917 defines *comuneros* as those who from time immemorial have enjoyed rights of usufruct of their ancestors’ lands managed under traditional communal schemes. *Communeros* are those who are members of a *comunidad*, one of Mexico’s two communal landholding institutions (Frias, 2004, p. 255).

was discussed by the participants thus acknowledging the wealth of local knowledge held in the community.

Using data from the ecological component of this research, we, the scientists, were able to share vividly recent and relevant information concerning the species' nest site selection preferences (Cabrera and Seutin in progress), mobility patterns and grassland post-fire recovery (Cabrera and Mendoza in progress). The conservation of the endangered SMS was discussed as an integrative part of the *monte* and we explored conservation possibilities for this species' habitat.

The process of exchange between academics and community members, between scientific and local knowledge created a synergy that led participants to engage in a process of analysis leading of explore the interconnections between conservation and their livelihoods which led them to identify the strength of their organizational capacities. As Meredith (1998) argues, when people are part of a process that generated information, a self-regulation system emerges as people begin to think about factors that affect them directly, think about the data that is linked to those factors and think about avenues of response. This process that involves research, awareness and action can also be explained as a cyclical, ongoing process of research, reflection and action including local people in generating knowledge, its analysis and action. Through the critical exploration of complex and dynamic issues that relate to the relationships between individuals, groups and their physical and socio-cultural environments, a social process that facilitates ongoing learning is put in place facilitating change (Korten 1980; White 1989).

Semi-structured interviews

Through the participatory process established by this study we were able to recognize key informants and grassland people, old “retired” herders as well as active ones. Herders in general were collaborative but because of the unusual setting provided by interviews, as people are not accustomed to being interviewed, it took more time to establish a relationship of trust between them and the researchers involved in interviewing. The “fire problem” and its association to livestock raisers, account for why herders were hesitant to be interviewed and reluctant to be recorded. Herders attendance in the workshops was limited because of time limitations, thus, we accommodated by organizing meetings in

the grasslands while their animals were grazing. Detailed information on grassland management, grassland deterioration, local conflicts and expectations for grassland conservation emerged.

Sharing results with the communities

Sharing results with the communities was an extremely important phase of the research process because of two reasons: first, at the beginning of the process as the terms of collaboration were established, it was agreed that all findings would be shared with the communities. Final research reports were delivered to Milpa Alta and San Juan Tlacotenco. In an attempt to make research findings more accessible to the community members, a video of the SMS was created and delivered to the *Representación General de Bienes Comunes* and local libraries. The initial agreements were done “*de palabra*”, by giving our word, a commitment that is taken with the same seriousness as a written contract and thus should be respected. Second, the delivery of results was organized by local communal authorities as an open meeting for the community members and people interested. In these sessions, main results were presented through multimedia methods and people continued to participate through a more informed reflection and discussion that enriched even more the actual outcomes and the participatory process. Thus, the sharing of results was integrated in the process of local awareness.

Traditional local knowledge and grassland management

Research findings suggest that grasses have historically and continue to represent a resource of great value to Milpa Alta and San Juan Tlacotenco community members. As a main source of cattle feed, grasses indirectly support the livelihood activities of a large number of community members for whom cattle raising is an important economic activity. Findings also suggest that from grasses people meet cultural and subsistence needs. Diverse extractive activities were documented. For example, leaves from the grass *Xoleman* were used for thatch roofing until the 60's. Leaves from *Calzacatl* are utilized as *hechaderos de gallina* or “beds” for hen production and also as part of the preparation of traditional gastronomical dishes, as a cover of *tamales*. Tips of the *Zacayemanqui* (the

grasses' inflorescence) are used to produce crafts of high economic value. In table 1 we present the main uses and local names of grasses found in this study.

Grasses as cattle feed

The principal use of grasses by local communities is for livestock grazing. This activity constitutes one of the dominant and productive activities of traditional communities settled south of the Mexican Valley. Official estimations report about 4000 cattle and 6000 sheep in the Milpa Alta municipality and 3250 cattle and 1500 sheep in the Municipality of Tepoztlan, of which San Juan Tlacotenco is a part of. (INEGI 2001). Milpa Alta has been recognized as one of the main meat producers for Mexico City's *barbacoa*⁹ market. Livestock grazing has taken place across the mountains south of Mexico City since post-colonial times (Hernández 2001). Testimonies from local herders state that this activity [pastoralism] has been practiced since immemorial times:

“we have always grazed these lands, sine my parents,
my grandparents, since we can remember...” Herder from
San Juan Tlacotenco

Table 1. Bunchgrassland species recognized by local pastorals and main uses associated.

Local name	Main uses	Scientific name
Calzacatl	Forage of regular quality. Raw material (thatches, crafts and diverse cultural uses).	<i>Muhlenbergia macroura</i>
Zacayemanqui	Forage considered of good quality	<i>Muhlenbergia quadridentata</i>
Xoleman, navaja.	Forage of good quality, only few days after fire. Raw material for roofs.	<i>Festuca lugens</i>

⁹ *Barbacoa* is a Mexican traditional dish made from sheep meet and cooked in pre-heated holes (in the soil).

The use of fire and grassland management

Local grasslands are burnt and converted into charcoal as a way to promote fresh grass re-growth for cattle feed (Mystri 1998; Whelan 1995; Knapp et al. 1998). Herders around the world set fires across savannas and grasslands in order to promote palatable grasses (Pyne *et al.* 1996; 2001b; Whatkinson and Ormerod 2001). Research findings indicate that local herders recognize the importance of fire for grassland maintenance for pastoral purposes. This is illustrated by the words of Julian Flores, herder since his infancy, who recognizes the importance of fire for grasslands, stating that “without fire, there is not grassland... [and] ... if there is no burning in several years, the grasslands grow too much”. Locals herders rely “on fire as an efficient and inexpensive tool for resource management” (Kull 2002:14). Results from this study show that community members have used the land for pastoral purposes since memorial times. Don Bartolo, a respected herder from San Juan mentioned that “in San Juan, in the past, almost all the people used to graze their animals; it was the principal activity in the town”. Herders draw on their traditional knowledge of fire management for pasture promotion.

Traditional knowledge on grassland management can be classified into three different areas: timing, frequency and location. Between the months of February and May, fires extend throughout the mountainous landscapes of the south of Mexico City. “Fires are better while they are closer to the rainy season”, it is the unanimous consensus from local voices. In this way, vegetation is less exposed to drought and soil is also not too affected. However, sometimes it is possible to find grasslands converted in charcoal in November or January.

According to local herders, this responds to an increasing loss of traditional knowledge. As an elderly herder from San Juan explained, “the problem is that people do not know anymore how to use fire...one should know when to do it, know what the condition of the vegetation is, you should know how the weather is coming”. According to this herder it is also important to recognize appropriate climatic conditions, which are affecting the degree of humidity on the local atmosphere and vegetation and wind conditions as well. He explained that “when you recognize these conditions, the fire burns evenly, smoothly, with no damage to the soil”.

Grasslands are burnt every two years in a rotational way within the land boundaries of San Juan Tlacotenco. Herders have created a mosaic of grassland successional states or conditions, where recently burnt grasses correspond to the patch under active pastoral use. Thus, this pre-established spatial pattern regulates, in some way, the subsequent fire occurrence, the fire regime. Observational data from this study indicates however, that fire regime varied from one locality to another. Fires were set annually within the boundaries of Milpa Alta, at the north of Llano de Morales, in the locality known as Zoquiac. Here, the fire frequency was higher than in San Juan Tlacotenco.

The fire conflict

Talking about fire with local people was not an easy task. This was so mainly because fire, in contemporary Mexican society, has been conceptualized as a destructive more than a constructive force (Pyne 2001; Rodriguez-Trejo and Fulé 2003). Signs around the region recommend residents to avoid setting fires in forested areas. Different testimonies from local community members indicate that locally fire is also perceived as a destructive force. Don Napoleon, an elder peasant from the town of San Pedro Atocpan (one of the nine towns of Milpa Alta) commented that according to him “fire is the worst threat to the forest, also pests, but fire sweeps too much, it is evil. They [the herders] think it is useful to promote grass renewal, but [I think] the grass is vanishing...grazing is not bad, but fire is”. Other local opinions support the fact that fire can be deleterious when fire regimes have been altered (see Benites 1987; Whelan 1995; Kull 2000; Rodriguez-Trejo and Fulé 2003). An elder herder from San Juan Tlacotenco explained that “there have been grassland areas without fire for several years (4-5 y), but when the fire came in, it provoked an immense fire that burnt [intensively] all the *llano*¹⁰ and even some trees in the nearby”.

A plethora of studies have shown that fire exclusion from certain ecosystems, may cause more intensive, destructive, costly and lethal fires due to high levels of biomass accumulation (Pyne 2001). Accordingly, Pyne argues that to understand the role fire plays in nature, we should look at its historical roots and consider the social

¹⁰ *Llano* is known locally as an open place in the *monte*, easily distinguished by the lacking of trees or existence of few and scattered tree individuals.

institutions and the natural background where fire has occurred. He elaborates that “...fire takes its character from its context” (Pyne 2001:1006). Rodriguez-Trejo and Fulé (2003) argued, in one of the few studies on fire ecology in Mexico, that many Mexican pine ecosystems are strongly influenced by fire and that pine species are adapted to a predictable fire regime. However, he discusses after examining fire responses in the 13 pine ecosystems of Mexico, that natural fire regimes have been altered by anthropogenic fires causing three different fire conditions in Mexico: 1) *Excessive fire*, when anthropogenic fire has dominated fire regimes, causing in combination with productive activities, environmental degradation. As an example, he mentioned the critical situation of the tropical and temperate forests; 2) *Appropriate fire*, when current fire regime plays a role maintaining a specific vegetation community, like for example the forests in the Sierra de los Ajos, Sonora, Sierra San Pedro Martir in Baja California and the Sierra Madre Occidental of Durango and Chihuahua; 3) *Insufficient fire*, when fire exclusion has occurred in order to reduce fuel accumulation and fire hazards from wildfire. This commonly happens in protected areas and reserves across the country (Rodriguez-Trejo 2003).

Phillips’ assertion (1936) that “fire is a bad master but a good servant” illustrates the point. Phillips made the allusion of fire “the master” representing the destructive fires caused by people with no knowledge of fire management, while fire “the servant” represents fires based on traditional knowledge and management practices associated (in van de Vijver 1999). Unfortunately, the “master” has been declared as the ruler on contemporary times.

Local herders in the study area did not recognize directly being responsible for burning the grasses. Uncontrolled burning in the grasslands has been discouraged by local official environmental agencies, particularly CORENA and SEMARNAP¹¹ and some herders have been prosecuted (R. Apel, CORENA). This has resulted in conflict. Livestock owners have been condemn as *incendiarists* and enemies of the environment (Kull 2000; Kull 2001). Burning practices have been declared by government and traditional local authorities, as the main culprit of tree plantation damage and

¹¹ SEMARNAP (*Secretaria del Medio Ambiente, Recursos Naturales y Pesca*) is the principal Mexican Institution responsible of environmental management and protection.

deforestation. As tree planting represents one of the main conservationists actions oriented to restore deforested areas, official fire prevention programs have emerged as an answer to control fires extension, location and timing. Thus, fire management has been passed (snatched) officially, to external hands of the communities and with a policy of prevention and control.

Prescribed fires operated by CORENA use to occur under well controlled technical conditions. They consider season, wind speed, slope, vegetation type and so on. However, for pastorals, the size of burnt areas under this way results insufficient for cattle feeding. In voice of local community members it is well know that this burning technique may cause overgrazing, due to the concentration of a high number of cows in a small area. Cattle raisers frequently stated that “we need more pasture than that, it is not enough for our animals”. They also argue that they are “like nomads”, “we moved all the time, we use to occupy different locations in a daily basis...our animals get angry if they are in just one place...that’s why we are moving all the time”.

Therefore, and “as a result of this new burning strategy, herders burn as they have before, just [taking] care not to get caught” (Kull 2002:14). Thus, current fire management in this landscape represents a product of the conflict between the state and local communities (see Kull 2002) and it is affecting potential avenues for grassland management for the conservation of this endangered species.

Land tenure, land use and change

To understand land change and its future it is necessary to understand main historical factors that have influenced land use through local institutions and actors (Hernández, 2001). In the Municipality of Milpa Alta there are deep-rooted land tenure conflicts between the nine towns ruled by communal land tenure and represented by the *Representación Comunal* and San Salvador Cuauhtenco, a town legally incorporated around 1900 as part of the Municipality. San Salvador Cuauhtenco is considered to be invading communal lands for the Milpa Alta’s *Representación Comunal* (Jurado 1992; Flores 1992 and Flores, J. pers. comm.). Since 1550, San Salvador Cuauhtenco claims the property rights of 7000 hectares of communal lands which overlap with the west part of Milpa Alta’s communal boundaries (Garcia 1992). In 1953, San Salvador Cuauhtenco

obtained presidential confirmation of their land limits, resolution that *comuneros* of Milpa Alta do not recognized as legitimate.

According to Jurado (1992), Flores (1992) and local informants from this study, the land tenure conflict between San Salvador Cuauhtenco and Milpa Alta has provoked historically drastic land speculation and land use change in the *monte*. Deforestation and agricultural encroachment over forested and grassed areas have occurred, principally since the 1950's and during the 1970's within this land under dispute. Jurado (1992, p. 108) states:

“Since a long time ago, the more intensive and lasting tree cutting [activity] was located at the southwest of the *montes*, due to that this region was [is] in dispute with San Salvador Cuauhtenco since 1952 until today”.

Land tenure conflicts have been recognized among the main catalyzers of environmental degradation (Unruh 1995; and Unruh, pers. comm.; Segura, n/d) and land privatization (Aguilar-Robledo 2001). Segura (n/d, p. 15) states that “the frequent presence of boundary conflicts ... has encouraged over-exploitation of forests along boundaries” and have created, “serious problems of open access and underestimation of the value of land”. The landscapes of Milpa Alta and San Juan Tlacotenco have changed as an expression of historical conflicts over land possession and use. Deforested areas and agricultural fields immersed in communally held forests and daily human activities such as hunting with fire, pesticide utilization and high fire frequency reflect the uncertain ownership character of this land. More “hidden” effects on the landscape as a result of overexploitation in disputed lands are reflected in vegetation conditions.

Ecological data from this study (1 and 2) indicates that a yearly fire frequency in combination with overgrazing, are not given enough time for recovery, thus promoting internal fragmentation of individual plants, low growing rate and grassland successional change (Benites 1987; Velázquez 1992; Verweij 1995). A different grassland state represented by the grass *Stipa ichu* (*Plumera*) has been created and started to replace *Festuca lugens* within this part of the current SMS' distributional range. These grassland conditions have resulted in unsuitable nesting conditions for the SMS during two consecutive years. In this part of SMS' distributional range, grasslands have been

identified to be in a process of fragmentation, deterioration and elimination (Cabrera and Escamilla 2000; Cabrera and Seutin, in prep.).

There are also intricate land tenure conflicts between Milpa Alta and San Juan Tlacotenco (Antonio Alvarado, *Representante Comunal* of San Juan Tlacotenco). In the *llano* known as “Llano de Morales”, livestock grazing has taken place since immemorial times. The main users are *comuneros* from San Juan Tlacotenco, who used to recognize this area to be located within their boundaries. Generally, Milpa Alta herders used to occupy grasses at the northeast of this *Llano*, close to the *Comalera* Volcanoe.

Under this intricate and complicate mixture of land ownerships, an interesting question is how have these particular grasslands in Llano de Morales managed to survive? A first hand explanation comes from the understanding of the role of different social and environmental factors that might be interacting in the maintenance of this location (see Köhler-Rollefson 1993). As we mentioned above, traditional pastoralism from San Juan Tlacotenco might be one of the factors as has been suggested for pastoralists societies in the world (Blench 2001; Benin and Pender 2002). Community members from San Juan Tlacotenco have used this land for livestock raise and as a source of diverse raw materials and medicinal plants. Through its ancestral use, people from San Juan Tlacotenco have found a way of legitimizing overlapped boundaries and secure land tenure rights as have been argued by Chevalier in 1976 (in Aguilar-Robledo 2001) and Unruh (2002).

Different testimonies from San Juan Tlacotenco’ herders agreed saying that “we must keep our cattle in the grasslands, if the people from Milpa Alta think that this is theirs, can you imagine what would happen if we are not here?”. Thus, land use for pastoral purposes by San Juan Tlacotenco’ herders may encloses valuable knowledge for grassland conservation. Scholars and scientists have recently recognized that traditional pastoral societies might represent guardians of biological diversity (Kohler-Rollefson, 1993; Blench, 2001) and stewards of grasslands. According to Kohler-Rollefson (1999, p: 1) “it has been brought to light that many pastoral societies have developed elaborate protection systems for the preservation of the vegetational resource of their grazing areas”.

Llano de Morales is where grassland conditions meet the required suitable conditions preferred for the SMS nesting (Cabrera and Seutin, in prep.). This landscape is dominated by the combination of the main bunchgrasses *Festuca lugens* or Xoleman, *M. macroura* or Calzacatl and *M. quadridentata* or Zacayemanqui that constitutes the typical components of the sub-alpine environments in the high mountains of the Mexico's Central region (Cabrera and Escamilla, 2000). As a consequence, this part of the SMS' distributional area has been classified in a spatial analysis as a priority area for the species' conservation (Cabrera and Escamilla 2000).

Thus, the contemporary landscape in this intersection of boundaries might be considered as shaped by a range of social institutions and social actors (Kepe and Scoones 1999; Walls *et al.* 1999). Grassland species composition and transitional grassland states (due to the rotational burning technique) might represent a direct product of human action, and they depend, as states Kepe and Scoones (1999) "on the relations of power between different social actors, and the institutional relationships that underpin these". Thus, land tenure rights and disputes, traditional grassland management, state fire policies, and the natural context may have, and are playing a role in shaping these communal resources.

An alternative answer to our question, but not exclusive of the first one, comes from the fact that the character of land in conflict, with not apparent resolution, has prevented its drastic transformation through land use change, for example, from pastoral to agricultural or even urban use. In a workshop held in San Salvador Cuauhtenco, a young community member questioned: "...thus, when the land tenure conflict finds a resolution, would the sparrow disappear?" If land ownership is considered as an important determinant of landscape uses and patterns (Gobin *et al.* 2001), the uncertainty in this disputed land may have caused precisely the dominance of a flexible, freedom of movement, low cost and successful activity where agriculture is unsuitable (Blench, 2001 and see Fernández-Giménez 2002) as the pastoral activity.

Pastorals can appear and disappear from the landscape in any moment and covert in economic benefits their livestock. Local herders seem to be aware of the situation and be ready for taking action. An anonymous herder from San Juan Tlacotenco made allusion of this when he mentioned: "if having cows may result a problem, I can sell all

of them and work in my *milpa*¹² instead”. Don Refugio, a herder and farmer from San Juan Tlacotenco mentioned that [in such a case] he might not need the grasslands as a cattle feed source. He believes he can maintain his activity as cattle raiser through fencing [in his part of the land] and using balanced prepared food. However, the idea of transforming grasslands to agricultural fields was also expressed as an alternative. A sheepherder from San Juan commented “if we were supported economically, we would saw in these lands”.

Thus, pastoralism in this area may represent a combination of tradition, shaped by historical roots, and a modern and flexible [and opportunistic?] mechanism shaped by current forces (Behneke and Scoones 1992; Fernández-Giménez 2002). In any of these cases, however, pastoralists are suffering impacts from the “tragedy of the commons” (Hardin 1968; Sheridan 2001). Excluding the fact that Llano de Morales represents a “well managed grassland” evidence of land degradation through soil erosion and grass damage have been documented in this study area. Herders from the entire region recognized negative environmental change occurring in the grasslands. “Grasses have become smaller” is a consensual opinion among herders. “Grasses are not like when I was kid, they were taller...they even could cover my horse”. Accordingly, data from the post-fire assessment study (2) have shown that plants also are fragmented and are in a process of decay (Cabrera and Mendoza in progress). Issues of open access and high livestock density should also be considered as current land shaping factors.

Thus, the future of this grassed landscape and endangered species in particular, may be considered as uncertain and might take different avenues and consequences for the communal resources on the communities involved.

V. Conclusions

Biodiversity conservation requires new and creative ways of thinking and action. The conservation of SMS has required its understanding from different angles and perspectives. The integration of inter-related sources of knowledge, both scientific and traditional and oriented to common goals and conciliating diverse interests, represented a valuable step forward towards the achievement of the research’ goals. Undoubtedly, the

¹² *Milpa* is a traditional crop of beans and corn used for household consumption (Frias, 2004).

vision to preserve the SMS has been widened remarkably through the understanding and integration of the social dimension, including different social actors and their institutions.

This research gave us the opportunity to learn that biodiversity as the conservation target might no result as relevant as we believe [as scientists] once you are in the ground. This study may give insights to those conservationists studying “unknown and non-utilitarian” species, species that may constitute an important part of the global biodiversity. Local interests helped to reorient our philosophy towards the SMS’ habitat, which is directly linked to local livelihoods and cultural values. Flexibility in the research agenda and consideration of local interests resulted important factors within the participatory process. The participatory process, once we establish a common platform of interests, it went through an interactive and continual process, where information flows continually evolved and were updated as more knowledge became available (Allen *et al* 1995; Meredith 1998).

Information and experiences from this study have also taken us a step closer to the conservation of the SMS. Local engagement in this study has provided a platform for analysis and action for local communities and communal authorities. The SMS’ situation is presently being integrated in local community-based decision-making structures as community members and CORENA authorities have initiated steps towards the establishment of a Communal Reserve in Milpa Alta (Servicios Forestales y Ambientales, 2002). The SMS’s grassland habitat has been incorporated within the proposed area for both grasslands and species conservation.

This study also demonstrates that local community members own a unique traditional knowledge on grasses’ main uses and pasture promotion and are indirectly yet intensely involved in the SMS’s conservation through grassland management practices. It also reveals the role played by institutions for communal land tenure in shaping the land through historical struggles for the land defense, traditional pastoralist practices and associated conflicts on fire use and land degradation. Furthermore, this study illustrates how land tenure conflicts have been and continues to play a role on past and potentially in future land uses of the *monte*. Undoubtedly, any suggestion of conservation practices without consideration of local people and local social-political conditions would render

unsuccessful results. Results and experiences derived from this research have contributed to the construction of a new reality-based conservation science.

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